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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/583,849

Applicant(s)

BUCHERT ET AL.

Examiner

ANTHONY J. CALANDRA

Art Unit

1791

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 June 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-26 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-26 is/are rejected.
- 7) ☒ Claim(s) 7, 18, 24 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SF/88)
Paper No(s)/Mail Date See Continuation Sheet
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :6/21/2006, 10/2/2006,6/20/2007 .

Detailed Office Action

1. The communication dated 6/21/2006 has been entered and fully considered.
2. Claims 1-26 are currently pending.

Double Patenting

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. Claims 1-5, 7-10, and 12-26 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-4, 6-10, 12, 13, and 15-22 of copending Application No. 10/583339. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant claims claim binding an agent to pulp using an oxidative process. The copending claims claim binding a modifying substance to cellulose using an oxidant and then contacting the modified cellulose with a hydrophobic polymer. The modifying substance can both be electrically conductive and act as a modifier.

The instant claims state that the bi-functional substance and the monomer can be the same substance [copending claim 12].

Instant claims 1, 2, and 12 see copending claims 1.

Instant claim 3 see copending claim 3.

Instant claim 4 see copending claims 2 and 3.

Instant claim 5 see copending claim 4.

Instant claims 7-10 see copending claims 6-10.

As for instant claim 13, the copending claims teach pulp fibers. Pulp fibers are either produced in chemical, mechanical, or chemimechanical (semi-chem) processes and therefore instant claim 13 is obvious in view of the copending application.

Instant claims 14, 16-19 see copending claims 12, 13, and 15-17

As for instant claim 20 it is *prima facie* obvious to optimize pH and temperature.

Enzymes are known to have optimum pH's in which they operate most effectively.

Instant claims 21-24 see copending claims 18-20.

Instant claim 25, see copending claim 21.

Instant claims 15 and 26 see copending claim 22.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

5. Claims 1-5 and 7-26 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-4, 6, and 8-20 of copending Application No. 10/583711. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant claims claim binding an agent to

pulp using an oxidative process. The copending claims claim binding a modifying substance to cellulose using an oxidant and then contacting the modified cellulose with a hydrophobic polymer. The modifying substance can both be electrically conductive and act as a modifier. The instant claims state that the bi-functional substance and the monomer can be the same substance [copending claim 12]. Alternatively the instant claims state a modifying agent can first be added and then a signaling agent can be bonded to the cellulose fiber. The copending claims state that conductivity is a signaling property.

Instant claims 1, 2, 11, and 12 see copending claims 1, 2, 6, and 9.

Instant claim 3 see copending claim 4

Instant claim 4 see copending claims 3 and 4.

Instant claim 5 see copending claim 19.

Instant claims 7-10 see copending claims 8, 10 and 11.

As for instant claim 13, the copending claims teach pulp fibers. Pulp fibers are either produced in chemical, mechanical, or chemimechanical (semi-chem) processes and therefore instant claim 13 is obvious in view of the copending application.

Instant claims 14, 16-19 see copending claims 12-15.

Instant claim 20 see copending claim 20. Further it is *prima facie* obvious to optimize pH and temperature. Enzymes are known to have optimum pH's in which they operate most effectively.

Instant claims 21-24 see copending claims 16-18.

Instant claim 25, see copending claim 12.

As for instant claims 15 and 26 it is *prima facie* obvious to change the sequence of adding ingredients.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

6. Claims 1-5 and 7-26 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-4, 6, and 8-20 of copending Application No. 10/583712. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant claims claim binding an agent to pulp using an oxidative process. The copending claims claim binding a modifying substance to cellulose using an oxidant and then contacting the modified cellulose with a hydrophobic polymer. The modifying substance can both be electrically conductive and act as a modifier. The instant claims state that the bi-functional substance and the monomer can be the same substance [copending claim 12]. Alternatively the instant claims state a modifying agent can first be added and then a second agent can be bonded to the cellulose fiber. The copending claims state that conductivity is a signaling property.

Instant claims 1, 2, 11, and 12 see copending claims 1, 5, 12 and 16.

Instant claim 3 see copending claim 3

Instant claim 4 see copending claims 2 and 3.

Instant claim 5 see copending claim 25

Instant claims 7-10 see copending claims 15, 17, and 18.

As for instant claim 13, the copending claims teach pulp fibers. Pulp fibers are either produced in chemical, mechanical, or chemimechanical (semi-chem) processes and therefore instant claim 13 is obvious in view of the copending application.

Instant claims 14, 16-19 see copending claims 19-22

Instant claim 20 see copending claim 26. Further it is *prima facie* obvious to optimize pH. Enzymes are known to have optimum pH's in which they operate most effectively.

Instant claims 21-24 see copending claims 23, 28, and 29.

Instant claim 25, see copending claim 30.

Instant claims 15 and 26 see copending claim 31.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

7. Claims 1-5, 7, and 12-16 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-17 and 19 of copending Application No. 10/583340. Although the conflicting claims are not identical, they are not patentably distinct from each other because the instant claims claim binding an agent to pulp using an oxidative process. The copending claims claim binding a substance that interferes with reactivity of the fibers. A substance can make a fiber conductive and also interfere with reactivity. While the instant claims state that first a bifunctional substance is added and then a conductive monomer is added, the instant claims state that the bifunctional substance and the monomer can be the same substance [copending claim 12].

Instant claims 1, 2, and 12 see copending claims 1 and 3.

Instant claim 3 see copending claim 4.

Instant claim 4 see copending claims 2 and 4.

Instant claim 5 see copending claim 16.

Instant claims 7-10 see copending claims 5, 6, 7 and 8

As for instant claim 13, the copending claims teach pulp fibers. Pulp fibers are either produced in chemical, mechanical, or chemimechanical (semichem) processes and therefore instant claim 13 is obvious in view of the copending application.

Instant claims 14, 16-19 see copending claims 9-12.

Instant claim 20 see copending claim 17. Further it is prima facie obvious to optimize pH. Enzymes are known to have optimum pH's in which they operate most effectively.

Instant claims 21-24 see copending claims 13-15.

As for instant claim 25, at least some light radiation (including UV) strikes the pulp/paper web capable of oxidizing a phenol group of the copending application. Examiner notes peroxide with ultraviolet light forms hydroxyl radicals, an advanced oxidation process.

Instant claims 15 and 26 see copending claim 19.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Objections

8. Claim 7 is objected to because of the following informalities: Missing space between 'claim1'. Appropriate correction is required.
9. Claim 18 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the

claim(s) in independent form. Claim 18 is dependent on claim 17 which only discloses two enzymes; claim 18 further expands this to more than two types of enzymes.

10. Claim 24 is objected to because of the following informalities: Missing end period.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

11. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

12. Claim 25 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. The claim states that radiation capable of oxidizing the fibrous material should be used however, neither the specification nor the claim state in any manner how much radiation is needed, where and when the radiation is used on the fibrous material (low consistency, medium consistency, or once a sheet has been formed), and finally it is not clear whether the radiation requires or doesn't require the other oxidizing agents (the enzymes, peroxides etcetera).

13. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

14. Claims 6, 8, 16, 19, 20, 21, and 25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 6, applicant claims 'derivatives thereof' of claimed substances can be used as the polymer. It is unclear which substances are considered by the applicant as derivatives and which substances would not be considered derivatives. Therefore the examiner cannot determine the proper metes and bounds on patent protection desired.

In claim 8, applicant states the modifying agent comprises one phenolic hydroxyl or similar structural group. It is unclear which substances are considered by the applicant to be structurally similar to phenolic hydroxyl groups and which substances are not structurally similar. Therefore the examiner cannot determine the proper metes and bounds on patent protection desired.

Claim 16 recites the limitation "the enzyme" in line 1. There is insufficient antecedent basis for this limitation in the claim. The 'enzyme' is not mentioned in claim 15; claim 16 should depend upon claim 14.

A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*,

86 USPQ 481 (Bd. App. 1949). In the present instance, claim 19 recites the broad recitation 1-100,000 nkat/g, and the claim also recites 10-500 nkat/g which is the narrower statement of the range/limitation. The claim also states the limitation .00001 to 10 mg of enzyme per gram of dry matter which is in fact a third range.

In claim 19, the applicant claims an enzyme dosage nkat/g (nanokatal/g) which the examiner has interpreted as an enzyme activity on pulp. However, the applicant does not state what the defined assay conditions this enzyme activity is measured. At different temperatures, pHs, and substrate being oxidized an enzyme can have different activities. Therefore the examiner cannot determine the proper metes and bounds of patent protection desired by the applicant.

Claim 20 recites the broad recitation 5-100 degrees C, and the claim also recites 10-85 and 20 to 80 degrees C which is the narrower statement of the range/limitation.

Regarding claim 21, the phrase "such as" renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Claim 25 provides for the use of radiation, but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claim Rejections - 35 USC § 102 and 103

15. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

18. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

19. Claims 1-9, 12-13, 15, and 21-26 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over U.S. Patent 5,211,810

BARTHOLOMEW et al., hereinafter BART.

As for claims 1, 2, 12, 15, and 26, BART discloses a process of treating a cellulosic pulp with an oxidant and a conductive polymer as to bond the conductive polymer to the cellulose fiber [abstract]. BART discloses the use of cellulosic fibers including high kappa fibers which contain phenolic structural groups [column 3 lines 53-55 and column 6 Table 1]. BART discloses treating the fibers with an oxidant to initiate polymerization including ammonium persulfate and ferric chloride [column 4 lines 5-9].

The added monomer polymerizes onto the fiber and the concentration of the monomer is controlled such that further polymerization of the conductive polymer occurs on the fiber [column 8 lines 9-15]. In the teachings of BART the bi-functional substance and the monomer are the same.

BART adds the bi-functional monomer and then adds the oxidizing agent [column 11, line 65 - column 12, line 10]. Examiner has interpreted the addition of the oxidant directly after the addition of the monomer/bi-functional agent, to be a simultaneous addition. Further since, the oxidized fiber is contacted with the bi-functional substance/monomer and the fiber is not oxidized until the oxidant is added the addition necessarily occurs simultaneously. Alternatively, it would have been prima facie obvious to change the order of addition of the reactants [see e.g. MPEP 2144.04 (IV) (C) Changes in Sequence of Adding Ingredients].

As for claims 3, 4, 23 and 24, BART discloses the oxidation agent of ammonium persulfate [column 8 lines 20-25].

As for claim 5, BART discloses the consistency of 1.9 to 3.7% which falls within the instant claimed range [column 7 lines 10-14].

As for claim 6, BART discloses the conductive polymers of polyaniline and polypyrrole [column 8 lines 50-55]. BART also discloses the monomer acetylene and thiophene [column 7 lines 49-50]. The polymeric forms of these monomers are polyacetylene and polythiophene.

As for claim 7, 8 and 9, BART discloses the monomers acetylene, aniline, pyrrole, paraphenylene, and thiophene all of which have at least two functional groups [column 3 lines 65-67]. As for claim 8, aniline contains a benzene ring with a NH₂ group attached which the examiner has interpreted as a similar structural group to a substituted OH groups. Aniline is a benzene ring with a NH₂ group and phenol is a benzene ring with a hydroxyl group. As for claim 9, aniline has an amine functional group. Pyrrole has a secondary amine group.

As for claim 13, BART discloses both low lignin chemical pulps and high lignin mechanical pulps [column 6 lines 55-62].

As for claim 21 and 22, BART discloses ammonium persulfate [column 4 lines 5-9]. Applicant states peroxide containing compounds are 'oxygen and oxygen containing compounds'. Ammonium persulfate is a peroxide compound and similarly releases oxygen.

As for claim 25, it is not clear the steps or the amount of radiation emitted onto the fiber, or consistency of the fiber. As paper web/pulp are subjected to light on a paper machine, at least some light radiation (including UV) strikes the pulp/paper web capable of oxidizing a phenol group. Examiner notes peroxide with ultraviolet light forms hydroxyl radicals, an advanced oxidation process.

20. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,211,810 BARTHOLOMEW et al., hereinafter BART.

As for claim 11, BART discloses multiple conductive monomers can be used to form and conductive polymer bound to the fiber [column 3 lines 65-67]. If a person of ordinary skill in the art were to use a mixture of the monomer disclosed by BART then the monomer and bi-functional substance would be different. In some cases the first monomer would act as a bi-functional substance while the second monomer would bond to the first monomer and act as the conductive polymer. Conversely, the second monomer would also bond to the fiber while the first monomer would bond to the second monomer and act as the conductive polymer. It is *prima facie* obvious to combine equivalents known for the same purpose [see e.g. MPEP 2144.06 (I) Combining Equivalents Known for the Same Purpose].

21. Claims 14, 16, 17, 18, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,211,810 BARTHOLOMEW et al., hereinafter BART, In view of U.S. Patent 6,187,136 PEDERSON, hereinafter PEDERSON.

As for claim 14 and 16-18, BART discloses that the bonding of the conductive polymers is accomplished by oxidation using a chemical oxidant [abstract]. BART discloses that other oxidants can be used to promote polymerization [column 8 lines 15-25]. BART does not disclose using an oxidative enzyme. PEDERSON discloses using enzymes such as laccase and oxidase to oxidize lignocellulosic materials [column 6 lines 1-35]. At the time of the invention it would have been *prima facie* obvious to substitute the chemical oxidant of BART for the enzymatic oxidant of PEDERSON. A person of ordinary skill in the art would be motivated to do so PEDERSON discloses that either chemical or enzymatic agents can be used to bind

substances to lignocellulosic materials [column 1 lines 64-67]. It is *prima facie* obvious to substitute equivalents known for the same purpose [see e.g. MPEP 2144.06 (II) Substituting Equivalents Known for the Same Purpose]. In the instant case both chemical and enzymatic oxidants are known to graft chemicals onto lignocellulosic fibers. A person of ordinary skill in the art would expect the enzymes of PEDERSON to graft the monomers of BART onto the fiber.

As for claim 19, PEDERSEN discloses 0.0001 - 10mg/g of dry matter which is the instant claimed range [column 6 lines 60-67]. The applicant claims an enzyme dosage nkat/g (nanokatal/g) which the examiner has interpreted as an enzyme activity on pulp. However, the applicant does not state what the defined assay conditions this enzyme activity is measured. At different temperatures an enzyme can have different activities. Therefore the examiner cannot determine the proper metes and bounds of patent protection desired by the applicant. PEDERSEN discloses 0.02 LACU/g -2000 LACU/g [column 6 lines 40-47] of enzyme where an LACU is measured under disclosed conditions [column 6 lines 55-60]. Until shown otherwise the examiner has interpreted these ranges to overlap with the instant claimed ranges [since the applicant fails to define the units].

Alternatively, at the time of the invention it would have been obvious to optimize the enzyme activity on pulp [2144.05 (II) (B) Optimization of ranges and result effective variables]. PEDERSEN clearly shows enzyme activity on pulp to be a result effective variable and therefore its optimization would have been obvious to a person of ordinary skill, absence evidence of unexpected results.

As for claim 20, PEDERSON discloses the temperature range of 20-80 degrees C which is the instant claimed range, and discloses a pH of 4-9 which falls within the instant claimed range [column 8 lines 31 and line 48].

As for claims 21-24, PEDERSON discloses peroxide, a chemical oxidizing agent, can be used in combination with the enzyme [column 8 lines 4-10].

22. Claims 1-10, 12-18 and 20-26 are rejected under 35 U.S.C. 102(b) as anticipated by U.S. Patent 6,187,136 PEDERSON et al., hereinafter PEDERSON.

As for claims 1, 2, and 12, PEDERSON discloses a three step process where lignocellulose with phenolic groups is oxidized by way of an enzyme [abstract] and a bi-functional monomer is attached to the fiber [column 5 lines 13-50]. Subsequent to the bi-functional monomer being attached a strengthening agent including polyacrylate is added to the mixture [column 9 lines 5-10].

PEDERSON discloses that the bi-functional monomer can also be aromatic amines; aniline is an aromatic amines [column 9 lines 30-47]. In the case of combining using an aromatic amine, the amine will act as both a bi-functional monomer and as a polymer as it radicalizes in solution with the lignocellulose.

As for claims 3, 4, 14 and 16-18, PEDERSON discloses using enzymes such as laccase and oxidase to oxidize lignocellulosic materials and modifying agents [column 6 lines 1-35].

As for claim 5, PEDERSON discloses a consistency of ~2% which falls within the instant claimed range [column 10 lines 14].

As for claim 6, the polymer of phenylene diamine [column 9 lines 35-40] is a derivative of aniline (one extra NH₂ group) and will form polyaniline derivative when radicalized.

As for claims 7-10, PEDERSON discloses phenylene diamine [column 9 lines 35-40] which has a plurality of functional groups including two second amine functional groups. Phenylene diamine contains a benzene ring with a NH₂ group attached which the examiner has interpreted as a similar structural group to a substituted OH groups. PEDERSON also discloses phenolic compounds with carboxylic acid groups and one or more phenolic groups [column 5 lines 9-50].

As for claim 13, PEDERSON discloses mechanical pulp [column 4 lines 57-67].

As for claims 15 and 26, PEDERSON discloses that the treatment can take place simultaneously or sequentially [column 4 lines 1-35].

As for claim 20, PEDERSON discloses the temperature range of 20-80 degrees C which is the instant claimed range, and discloses a pH of 4-9 which falls within the instant claimed range [column 8 lines 31 and line 48].

As for claims 21-24, PEDERSON discloses peroxide, a chemical oxidizing agent, can be used in combination with the enzyme [column 8 lines 4-10].

As for claim 25, it is not clear the steps or the amount of radiation emitted onto the fiber, or consistency of the fiber. As paper web/pulp are subjected to light on a paper machine, at least some light radiation (including UV) strikes the pulp/paper web capable of oxidizing a phenol group. Examiner notes peroxide with ultraviolet light forms hydroxyl radicals, an advanced oxidation process.

23. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,187,136 PEDERSON et al., hereinafter PEDERSON.

As for claim 11, PEDERSON discloses multiple conductive monomers can be used to form and conductive polymer bound to the fiber [column 9 lines 30-46]. If a person of ordinary skill in the art were to use a mixture of the monomer disclosed by PEDERSON then the monomer and bi-functional substance would be different. In some cases the first monomer would act as a bi-functional substance while the second monomer would bond to the first monomer and act as the conductive polymer. Conversely, the second monomer would also bond to the fiber while the first monomer would bond to the second monomer and act as the conductive polymer. It is *prima facie* obvious to combine equivalents known for the same purpose [see e.g. MPEP 2144.06 (I) Combining Equivalents Known for the Same Purpose].

24. Claim 19 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over U.S. Patent 6,187,136 PEDERSON et al., hereinafter PEDERSON.

As for claim 19, PEDERSEN discloses 0.0001 - 10mg/g of dry matter which is the instant claimed range [column 6 lines 60-67]. The applicant claims an enzyme dosage nkat/g (nanokatal/g) which the examiner has interpreted as an enzyme activity on pulp. However, the applicant does not state what the defined assay conditions this enzyme activity is measured. At different temperatures an enzyme can have different activities. Therefore the examiner cannot determine the proper metes and bounds of patent protection desired by the applicant. PEDERSEN discloses 0.02 LACU/g -2000 LACU/g [column 6 lines 40-47] of enzyme where an LACU is measured under disclosed conditions [column 6 lines 55-60]. Until shown otherwise the examiner has interpreted these ranges to overlap with the instant claimed ranges [since the applicant fails to define the units].

Alternatively, at the time of the invention it would have been obvious to optimize the enzyme activity on pulp [2144.05 (II) (B) Optimization of ranges and result effective variables]. PEDERSEN clearly shows enzyme activity on pulp to be a result effective variable and therefore its optimization would have been obvious to a person of ordinary skill, absence evidence of unexpected results.

25. Claims 1-11 and 13-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,187,136 PEDERSON et al., hereinafter PEDERSON, in view of U.S. Patent 5,211,810 BARTHOLOMEW et al., hereinafter BART.

As for claim 1, 2, and 11, PEDERSON discloses a three step process where lignocellulose with phenolic groups is oxidized by way of an enzyme [abstract] and a bi-functional monomer is attached to the fiber [column 5 lines 13-50]. Subsequent to the bi-functional monomer being attached a strengthening agent including polyacrylate is added to the mixture [column 9 lines 5-10].

PEDERSON does not disclose adding the polyacrylate as a monomer and it is not clear if polyacrylate acts as a conductive polymer. BART discloses treating pulp with conductive monomers and with oxidative compounds [abstract]. At the time of the invention it would have been obvious to a person of ordinary skill in the art to follow the strengthening treatment of PEDERSON with the conductivity treatment of BART absence evidence of unexpected results. A person of ordinary skill in the art would be motivated to do so to have paper with increased both the increased strength of PEDERSON and conductive properties of BART [abstract]. Further, the person of ordinary skill in the art would expect the modifier added onto the pulp by PEDERSON to help attract and retain monomers and polymers of BART.

As for claim 3, 4, 14 and 16-18, PEDERSON discloses using enzymes such as laccase and oxidase to oxidize lignocellulosic materials and modifying agents [column 6 lines 1-35].

As for claim 5, PEDERSON discloses a consistency of ~2% which falls within the instant claimed range [column 10 lines 14].

As for claim 6, BART discloses the conductive polymers of polyaniline and polypyrrole [column 8 lines 50-55]. BART also discloses the monomer acetylene and thiophene [column 7 lines 49-50]. The polymeric forms of these monomers are polyacetylene and polythiophene.

As for claims 7-10, PEDERSON discloses phenylene diamine [column 9 lines 35-40] which has a plurality of functional groups including two second amine functional groups. Phenylene diamine contains a benzene ring with a NH₂ group attached which the examiner has interpreted as a similar structural group to a substituted OH groups. PEDERSON also discloses phenolic compounds with carboxylic acid groups and one or more phenolic groups [column 5 lines 9-50].

As for claim 13, PEDERSON discloses mechanical pulp [column 4 lines 57-67].

As for claims 15 and 26, PEDERSON discloses that the treatment can take place simultaneously or sequentially [column 4 lines 1-35].

As for claim 19, PEDERSEN discloses 0.0001 - 10mg/g of dry matter which is the instant claimed range [column 6 lines 60-67]. The applicant claims an enzyme dosage nkat/g (nanokatal/g) which the examiner has interpreted as an enzyme activity on pulp. However, the applicant does not state what the defined assay conditions this enzyme activity is measured. At different temperatures an enzyme can have different activities. Therefore the examiner cannot determine the proper metes and bounds of patent protection desired by the applicant.

PEDERSEN discloses 0.02 LACU/g -2000 LACU/g [column 6 lines 40-47] of enzyme where an LACU is measured under disclosed conditions [column 6 lines 55-60]. Until shown otherwise the examiner has interpreted these ranges to overlap with the instant claimed ranges [since the applicant fails to define the units].

Alternatively, at the time of the invention it would have been obvious to optimize the enzyme activity on pulp [2144.05 (II) (B) Optimization of ranges and result effective variables]. PEDERSEN clearly shows enzyme activity on pulp to be a result effective variable and therefore its optimization would have been obvious to a person of ordinary skill, absence evidence of unexpected results.

As for claim 20, PEDERSON discloses the temperature range of 20-80 degrees C which is the instant claimed range, and discloses a pH of 4-9 which falls within the instant claimed range [column 8 lines 31 and line 48].

As for claim 21-24, PEDERSON discloses peroxide, a chemical oxidizing agent, can be used in combination with the enzyme [column 8 lines 4-10].

As for claim 25, it is not clear the steps or the amount of radiation emitted onto the fiber, or consistency of the fiber. As paper web/pulp are subjected to light on a paper machine, at least some light radiation (including UV) strikes the pulp/paper web capable of oxidizing a phenol group. Examiner notes peroxide with ultraviolet light forms hydroxyl radicals, an advanced oxidation process.

Conclusion

26. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANTHONY J. CALANDRA whose telephone number is (571) 270-5124. The examiner can normally be reached on Monday through Thursday, 7:30 AM-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on (571) 272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AJC

/Eric Hug/

Primary Examiner, Art Unit 1791